

REMARKS

Claims 1-21 remain present in this application.

The specification and claims 1, 4, 5, 6, 13, 16, 17, 18 and 19 have been amended.

Reconsideration of the application, as amended, is respectfully requested.

Objection to the Claims

Claim 6 stands objected to under 37 CFR 1.75(c). Accordingly, this claim has been revised to recite “the cationic ion exchange groups” of claim 5. It is therefore respectfully submitted that this claim is in proper dependent form. Reconsideration and withdrawal of any objections to the claims are respectfully requested.

Amendments to the Claims

Claims 1, 13 and 19 have been amended to add the limitation “proton exchange organic membrane.” Support for this amendment can be found on page 10, lines 5-8, and page 17, lines 21-26 of the originally filed specification. A typographical error of “PVDF-g-poly(4-vinyl benzoic acid” has been corrected in claim 5, and claim 6 has been amended as noted above. It is respectfully submitted that no new matter is present in the foregoing amendments.

Rejection under 35 USC 103

Claims 1-4 and 6-21 stand rejected under 35 USC 103 as being unpatentable over Murphy et al., U.S. Patent 6,059,943. This rejection is respectfully traversed.

Claim 5 stands rejected under 35 USC 103 as being unpatentable over Murphy et al. in view of Asukable et al., U.S. Publication 2001/0026893. This rejection is respectfully traversed.

Independent claim 1 recites a layered proton exchange membrane, comprising an organic/inorganic composite membrane, comprising inorganic proton conductor and organic base polymer, and at least one **proton exchange organic membrane**.

Independent claim 13 recites a method for preparing a layered proton exchange membrane, comprised of (a) forming an organic/inorganic composite membrane by doping inorganic proton conductor in organic base polymer; and (b) combining the organic/inorganic complex membrane and a **proton exchange organic membrane** to form a layered proton exchange membrane.

Independent claim 19 recites a direct liquid-feed methanol fuel cell, comprising a cathode, an anode; and a layered proton exchange membrane, formed by lamination of an organic/inorganic composite membrane with at least one **proton exchange organic membrane**, wherein the organic/inorganic composite membrane comprises organic base polymer and inorganic proton conductor.

In independent claims 1, 13 and 19, the layered proton exchange membrane comprises at least one **proton exchange organic membrane**. The Examiner's attention is drawn to page 10, lines 5-8, and page 17, lines 21-26, of the originally filed specification. It is noted that the layered proton exchange membrane of the present invention comprises not only an organic/inorganic composite membrane, but also at least one proton exchange organic membrane. This is important because the proton exchange organic membrane has a higher conductivity than the inorganic proton conductor. In an organic/inorganic composite membrane,

the MeOH permeability can be increased by increasing the amount of the inorganic conductor. This, however, would decrease the conductivity of the proton exchange membrane. In the present invention, the **combination of a composite membrane and a proton exchange membrane** provides satisfying MeOH permeability without sacrificing conductivity.

The Examiner relies on Murphy et al. to teach a composite membrane. It is agreed that Murphy et al. teaches a membrane comprising an inorganic material dispersed in a polymer matrix. However, Murphy et al. does not teach or suggest “a layered proton exchange membrane, formed by lamination of an organic/inorganic composite membrane with at least one **proton exchange organic membrane**.” Referring to Fig. 12 and claim 1, the patent to Murphy et al. only provides a single composite membrane without an additional proton exchange organic membrane. Indeed, Murphy et al. only teaches a single-layered composite membrane. Murphy et al. would therefore not lead one to form a layered proton exchange membrane comprising an organic/inorganic composite membrane and a proton exchange organic membrane.

In addition, Murphy et al. fails to teach or suggest the method for forming the layered composite membrane, such as thermal pressing, chemical cross-linking, or UV radiation cross-linking as recited in claim 15.

The secondary reference to Asukable et al. fails to overcome the above-noted deficiencies of the primary reference to Murphy et al.

It is therefore respectfully submitted that the prior art utilized by the Examiner, either alone or in combination, fails to teach or suggest independent claims 1, 13 and 19, as well as their dependent claims. Reconsideration and withdrawal of the 35 USC 103 rejections are respectfully requested.

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Conclusion

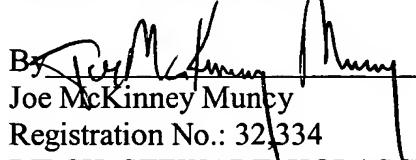
Favorable reconsideration and an early Notice of Allowance are earnestly solicited.

In the event that any outstanding matters remain in this application, the Examiner is invited to contact the undersigned at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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